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DIODES, VOLTAGE REGULATORS,

BASED ON SERIES BZX85C

ESA/SCC Detail Specification No. 5102/002

space components
coordination group

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		SCCG Chairman	ESA Director General or his Deputy
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DOCUMENTATION CHANGE NOTICE

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		Cover page	None
		DCN	None
		Table 1(a) : For Type Variant 11, High Temperature I_R limit changed to 20µA.	22197
		Table 1(b) : P_D changed to 1.3W;	22172
		T_{stg} changed to -65 to +150°C	22172
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		Para 2 : MIL-STD-1276 deleted	21025
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		Table 3 : Note 3 added to Table and Notes	22172
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		P6. Table 1(a) : Lead Material and/or Finish added	21025
		P7. Table 1(a) : Lead Material and/or Finish added	21025
		P11. Para. 4.2.2 : PIND deviation amended	21043
		Para. 4.2.3 : Radiographic Inspection deviation amended	21049
		P16. Table 3 : Note 3 deleted	21047
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DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	CHANGE Reference Item	Approved DCR No.
'C'	Oct. '94	P1. Cover page P2A. DCN : Page added P16. Table 3 : No. 1, reference to Note 3 deleted This document has been transferred from hardcopy to electronic format. The content is unchanged but minor differences in presentation exist.	None None 23638
'D'	July '96	P1. Cover page P2A. DCN P3. T of C : Para. 1.7 entry added P5. Para. 1.7 : Paragraph added	None None 21083 21083

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FIGURES

APPENDICES (Applicable to specific Manufacturers only)
None.

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Diodes, Voltage Regulator, based on Series BZX 85.

It shall be read in conjunction with ESA/SCC Generic Specification No. 5000, the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS

Variants of the basic diodes specified herein, which are also covered by this specification, are given in Table 1(a).

1.3 MAXIMUM RATINGS

The maximum ratings, which shall not be exceeded at any time during use or storage, applicable to the diodes specified herein, are scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION

The derating information applicable to the diodes specified herein is shown in Figure 1.

1.5 PHYSICAL DIMENSIONS

The physical dimensions of the diodes specified herein are shown in Figure 2.

1.6 FUNCTIONAL DIAGRAM

The functional diagram, showing lead identification, of the diodes specified herein, is shown in Figure 3.

1.7 HIGH TEMPERATURE TEST PRECAUTIONS

For tin-lead plated or solder-dipped lead finish, all tests to be performed at a temperature that exceeds +125°C shall be carried out in a 100% inert atmosphere.

2. APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:

(a) ESA/SCC Generic Specification No. 5000 for Discrete Semiconductors.

(b) MIL-STD-750, Test Methods and Procedures for Semiconductor Devices.

TABLE 1(a) - TYPE VARIANTS

Variant (1)	Based onType (2)	V_Z Nom. V (3)	V_Z Min. V (4)	V_Z Max. V (5)	I_Z (mA) (6)	I_{Zmax} (mA) (7)	Z_{Zmax} (Ω) (8)	V_R (V) (9)	I_R (max. μA) (10)	I_R (μA) Tamb = +150°C (11)	Z_K (max. Ω) (12)	I_{ZK} (mA) (13)	Lead Material and Finish (14)
01	BZX 85 - C2V7	2.7	2.5	2.9	80	370	20	1.0	150	Max. 300	400	1.0	C3 or C4
02	BZX 85- C3V0	3.0	2.8	3.2	80	340	20	1.0	100	" 300	400	1.0	C3 or C4
03	BZX 85 - C3V3	3.3	3.1	3.5	80	320	20	1.0	40	" 200	400	1.0	C3 or C4
04	BZX 85 - C3V6	3.6	3.4	3.8	60	290	20	1.0	20	" 50	500	1.0	C3 or C4
05	BZX 85 - C3V9	3.9	3.7	4.1	60	280	15	1.0	10	" 20	500	1.0	C3 or C4
06	BZX 85 - C4V3	4.3	4.0	4.6	50	250	13	1.0	3.0	" 10	500	1.0	C3 or C4
07	BZX 85 - C4V7	4.7	4.4	5.0	45	215	13	1.0	3.0	" 10	600	1.0	C3 or C4
08	BZX 85 - C5V1	5.1	4.8	5.4	45	200	10	1.5	1.0	" 10	500	1.0	C3 or C4
09	BZX 85 - C5V6	5.6	5.2	6.0	45	190	7.0	2.0	1.0	" 10	400	1.0	C3 or C4
10	BZX 85 - C6V2	6.2	5.8	6.6	35	170	4.0	3.0	1.0	" 10	300	1.0	C3 or C4
11	BZX 85 - C6V8	6.8	6.4	7.2	35	155	3.5	4.0	1.0	" 20	300	1.0	C3 or C4
12	BZX 85 - C7V5	7.5	7.0	7.9	35	140	3.0	4.5	1.0	" 10	200	0.5	C3 or C4
13	BZX 85 - C8V2	8.2	7.7	8.7	25	130	5.0	6.2	1.0	" 10	200	0.5	C3 or C4
14	BZX 85 - C9V1	9.1	8.5	9.6	25	120	5.0	6.8	1.0	" 10	200	0.5	C3 or C4
15	BZX 85 - C10	10	9.4	10.6	25	105	7.0	7.5	0.5	" 10	200	0.5	C3 or C4
16	BZX 85 - C11	11	10.4	11.6	20	97	8.0	8.2	0.5	" 10	300	0.5	C3 or C4
17	BZX 85 - C12	12	11.4	12.7	20	88	9.0	9.1	0.5	" 10	350	0.5	C3 or C4
18	BZX 85 - C13	13	12.4	14.1	20	79	10	10	0.5	" 10	400	0.5	C3 or C4
19	BZX 85 - C15	15	13.8	15.6	15	71	15	11	0.5	" 10	500	0.5	C3 or C4
20	BZX 85 - C16	16	15.3	17.1	15	66	15	12	0.5	" 10	500	0.5	C3 or C4
21	BZX 85 - C18	18	16.8	19.1	15	62	20	13	0.5	" 10	500	0.5	C3 or C4
22	BZX 85 - C20	20	18.8	21.2	10	56	24	15	0.5	" 10	600	0.5	C3 or C4
23	BZX 85 - C22	22	20.8	23.3	10	52	25	16	0.5	" 10	600	0.5	C3 or C4
24	BZX 85 - C24	24	22.8	25.6	10	47	25	18	0.5	" 10	600	0.5	C3 or C4
25	BZX 85 - C27	27	25.1	28.9	8.0	41	30	20	0.5	" 10	750	0.25	C3 or C4

TABLE 1(a) - TYPE VARIANTS (Cont'd)

Variant (1)	Based onType (2)	V_Z Nom. V (3)	V_Z Min. V (4)	V_Z Max. V (5)	I_Z (mA) (6)	I_{Zmax} (mA) (7)	Z_{Zmax} (Ω) (8)	V_R (V) (9)	I_R (max. μA) (10)	I_R (μA) Tamb = +150°C (11)	Z_K (max. Ω) (12)	I_{ZK} (mA) (13)	Lead Material and Finish (14)
26	BZX 85 - C30	30	28	32	8.0	36	30	22	0.5	Max. 10	1000	0.25	C3 or C4
27	BZX 85 - C33	33	31	35	8.0	33	35	24	0.5	" 10	1000	0.25	C3 or C4
28	BZX 85 - C36	36	34	38	8.0	30	40	27	0.5	" 10	1000	0.25	C3 or C4
29	BZX 85 - C39	39	37	41	6.0	28	50	30	0.5	" 10	1000	0.25	C3 or C4
30	BZX 85 - C3	43	40	46	6.0	26	50	33	0.5	" 10	1000	0.25	C3 or C4
31	BZX 85 - C47	47	44	50	4.0	23	90	36	0.5	" 10	1500	0.25	C3 or C4
32	BZX 85 - C51	51	48	54	4.0	21	115	39	0.5	" 10	1500	0.25	C3 or C4
33	BZX 85 - C56	56	52	60	4.0	19	120	43	0.5	" 10	2000	0.25	C3 or C4
34	BZX 85 - C62	62	58	66	4.0	16	125	47	0.5	" 10	2000	0.25	C3 or C4
35	BZX 85 - C68	68	64	72	4.0	15	130	51	0.5	" 10	2000	0.25	C3 or C4
36	BZX 85 - C75	75	70	80	4.0	14	135	56	0.5	" 10	2000	0.25	C3 or C4
37	BZX 85 - C82	82	77	87	2.7	12	200	62	0.5	" 10	3000	0.25	C3 or C4
38	BZX 85 - C91	91	85	96	2.7	10	250	68	0.5	" 10	3000	0.25	C3 or C4
39	BZX 85 - C100	100	96	106	2.7	9.4	350	75	0.5	" 10	3000	0.25	C3 or C4
40	BZX 85 - C110	110	104	116	2.7	8.6	450	82	0.5	" 10	4000	0.25	C3 or C4
41	BZX 85 - C120	120	114	127	2.0	7.8	550	91	0.5	" 10	4500	0.25	C3 or C4
42	BZX 85 - C130	130	124	141	2.0	7.0	700	100	0.5	" 10	5000	0.25	C3 or C4
43	BZX 85 - C150	150	138	156	2.0	6.4	1000	110	0.5	" 10	6000	0.25	C3 or C4
44	BZX 85 - C160	160	153	171	1.5	5.8	1100	120	0.5	" 10	6500	0.25	C3 or C4
45	BZX 85 - C180	180	168	191	1.5	5.2	1200	130	0.5	" 10	7000	0.25	C3 or C4
46	BZX 85 - C200	200	188	212	1.5	4.7	1500	150	0.5	" 10	8000	0.15	C3 or C4

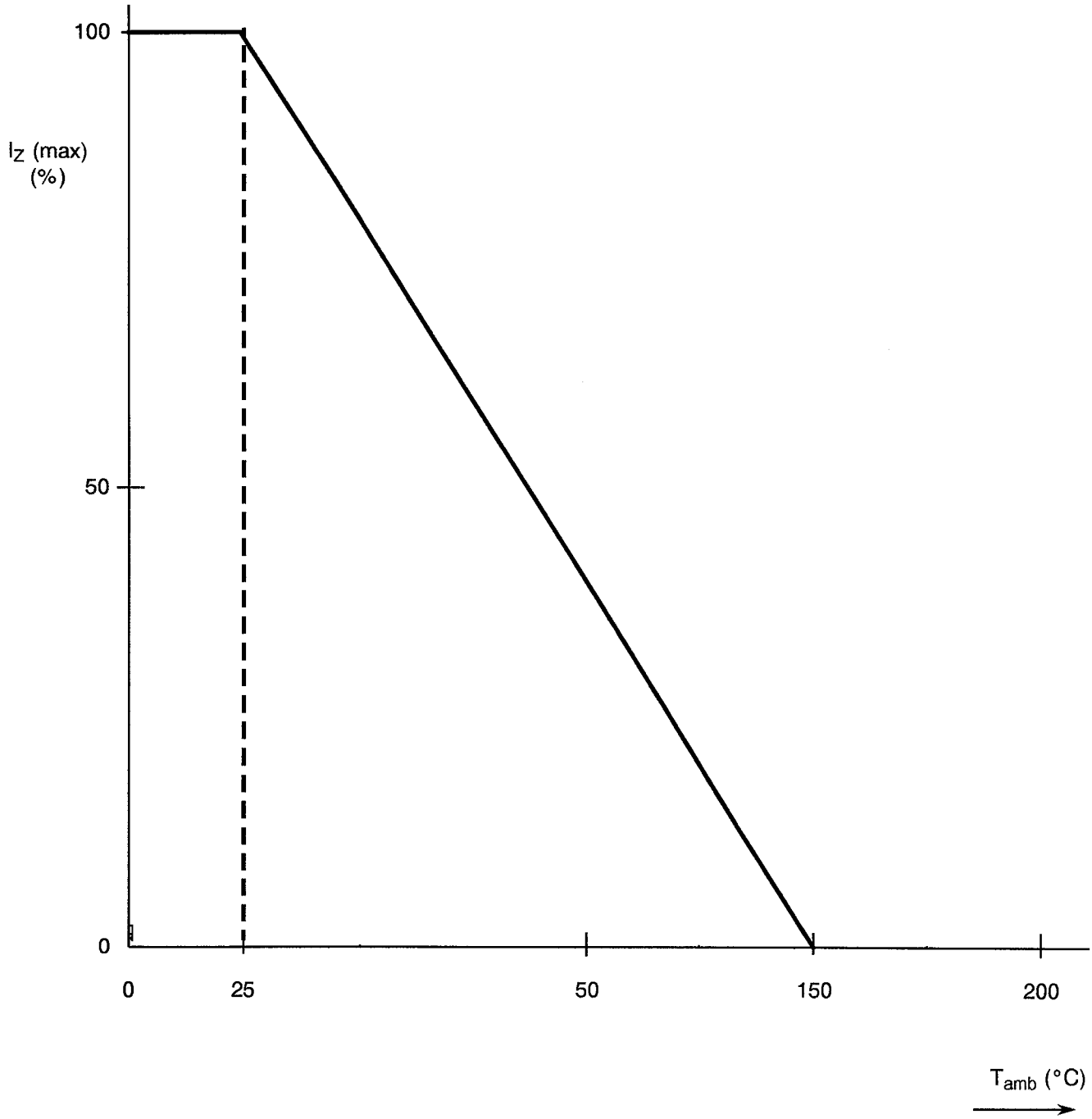
TABLE 1(b) - MAXIMUM RATINGS

No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATINGS	UNIT	REMARKS
1	Power Dissipation	P_{tot}	1.3	W	$T_{amb} \leq +25°C$ See Note
2	Operating Temperature Range	T_{op}	−55 to +150	°C	T_{amb}
3	Storage Temperature Range	T_{stg}	−65 to +150	°C	
4	Soldering Temperature	T_{sol}	+260	°C	Time: ≤10 seconds; Distance from case: ≥ 1.5mm

NOTES

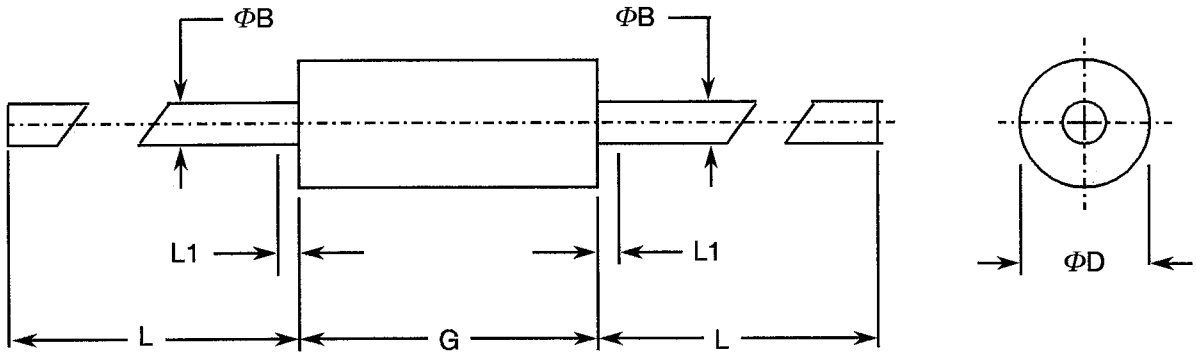
1. The leads shall be maintained at ambient temperature 4.0mm from the body.

FIGURE 1 - PARAMETER DERATING INFORMATION



Maximum Working Current (I_Z max) versus Temperature

FIGURE 2 - PHYSICAL DIMENSIONS



Millimetre dimensions are derived from basic inch dimensions.

SYMBOL	INCHES		MILLIMETRES		NOTES
	MIN.	MAX.	MIN.	MAX.	
ΦB	.028	.034	.712	.863	-
ΦB	.080	.107	2.04	2.71	1
G	.142	.205	3.60	5.20	1
L	1.10	-	28.0	-	-
L1	-	.050	-	1.27	2

NOTES

1. Package contour optional within cylinder of diameter ΦD and length G. Slugs, if any, shall be included within this cylinder but shall not be subject to the minimum limit of ΦD.
2. Lead diameter not controlled in this zone to allow for flash, lead finish build-up, and minor irregularities other than slugs.

FIGURE 3 - FUNCTIONAL DIAGRAM

1. Anode
2. Cathode

NOTES

1. The cathode end shall be marked with a coloured ring.

3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESA/SCC Basic Specification No. 21300 shall apply.

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the diodes specified herein are stated in this specification and ESA/SCC Generic Specification No. 5000 for Discrete Semiconductors. Deviations from the Generic Specification applicable to this specification only, are listed in Para. 4.2.

Deviations from the applicable Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESA/SCC requirements and do not affect the components' reliability, are listed in the appendices attached to this specification.

4.2 DEVIATIONS FROM GENERIC SPECIFICATION

4.2.1 Deviations from Special In-process Controls

Not applicable.

4.2.2 Deviations from Final Production Tests (Chart II)

(a) Bond Strength Test: Shall not be performed.

(b) Die Shear Test: Shall not be performed.

(c) Particle Impact Noise Detection (PIND) Test: Not applicable.

4.2.3 Deviations from Burn-in and Electrical Measurements (Chart III)

(a) H.T.R.B. Test: Shall not be performed.

(b) Radiographic Inspection: Not applicable.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Bond Strength Test: Shall not be performed.

(b) Die Shear Test: Shall not be performed.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

None.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the diodes specified herein shall be checked. They shall conform to those shown in Figure 2.

4.3.2 Weight

The maximum weight of the diodes specified herein shall be 0.5 grammes.

4.3.4 Terminal Strength

The requirements for terminal strength testing are specified in Section 9 of ESA/SCC Generic Specification No. 5000. The test conditions shall be as follows:-

Test Condition : 'A'.
Applied Force : 5.0 Newtons.
Duration : 10 seconds

4.4 MATERIALS AND FINISHES

The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the diodes specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material does not guarantee acceptance of the finished product.

4.4.1 Case

Glass, hermetically sealed.

4.4.2 Lead Material and Finish

The lead material shall be Type 'C' with Type '3 or 4' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500.

4.5 MARKING

4.5.1 General

The marking of all components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700. Each component shall be marked in respect of:-

(a) Lead Identification.

(b) The SCC Component Number.

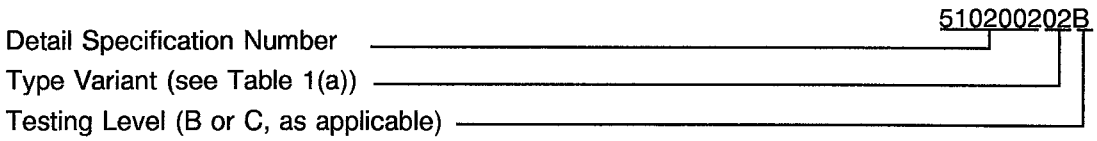
(c) Traceability Information.

4.5.2 Lead Identification

Lead identification shall be as shown in Figures 2 and 3 of this specification.

4.5.3 The SCC Component Number

Each component shall bear the SCC Component Number which shall be constituted and marked as follows:



4.5.4 Traceability Information

Each component shall be marked in respect of traceability information in accordance with the requirements of ESA/SCC Basic Specification No. 21700.

4.5.5 Marking of Small Components

When it is considered that the component is too small to accommodate the marking as specified above, as much as space permits shall be marked. The order of precedence shall be as follows:-

(a) Lead Identification.

(b) The SCC Component Number.

(c) Traceability Information.

The marking information in full shall accompany each component in its primary package.

4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured at room temperature are scheduled in Table 2. The measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.6.2 Electrical Measurements at High and Low Temperatures

The parameters to be measured at high and low temperatures are scheduled in Table 3.

4.6.3 Circuits for Electrical Measurements

Circuits for use in performing the electrical measurements listed in Tables 2 and 3 of this specification are shown in Figure 4.

4.7 BURN-IN TESTS

4.7.1 Parameter Drift Values

The parameter drift values applicable to burn-in are specified in Table 4 of this specification. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C. The parameter drift value (Δ) applicable to the parameters scheduled, shall not be exceeded. In addition to these drift value requirements, the appropriate limit value specified for a given parameter in Table 2 shall not be exceeded.

4.7.2 Conditions for Burn-in

The requirements for burn-in are specified in Section 7 of ESA/SCC Generic Specification No. 5000. The conditions for burn-in shall be as specified in Table 5 of this specification.

4.7.3 Electrical Circuits for Burn-in

Circuits for use in performing the burn-in tests are shown in Figure 5 of this specification.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - d.c. PARAMETERS

No.	CHARACTERISTICS	SYMBOL	SPEC. AND TEST METHOD MIL-STD-750	TEST CONDITION	LIMITS		UNIT
					MIN.	MAX.	
1	Zener Voltage	V_Z	Method 4022	I_Z = (1) mA	(2)	(3)	V
2	Reverse Current	I_R	Method 4016	V_R = (4) V	-	(5)	µA

NOTES

1. See Column 6 of Table 1(a).
2. See Column 4 of Table 1(a).
3. See Column 5 of Table 1(a).
4. See Column 9 of Table 1(a).
5. See Column 10 of Table 1(a).

a.c. PARAMETERS

No.	CHARACTERISTICS	SYMBOL	SPEC. AND TEST METHOD MIL-STD-750	TEST CONDITION	LIMITS		UNIT
					MIN.	MAX.	
1	Small Signal Breakdown Impedance	Z_Z	4051	I_Z = (1)	-	(2)	Ω
2	Knee Impedance	Z_K	4051	I_{ZK} = (4)	-	(3)	Ω

NOTES

1. See Column 6 of Table 1(a).
2. See Column 8 of Table 1(a).
3. See Column 12 of Table 1(a).
4. See Column 13 of Table 1(a).

FIGURE 4 - TEST CIRCUITS

Not applicable.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

No.	CHARACTERISTICS	SYMBOL	SPEC. AND TEST METHOD MIL-STD-750	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
1	Reverse Current	I_R	Method 4016.2	T_{amb} = +150°C V_R = (1)	-	(2)	nA

NOTES

1. See Column 9 of Table 1(a).
2. See Column 11 of Table 1(a).

TABLE 4 - PARAMETER DRIFT VALUES

No.	CHARACTERISTICS	SYMBOL	SPEC. AND TEST METHOD	TEST CONDITIONS	CHANGE LIMITS (Δ)	UNIT
1	Zener Voltage	V_Z	Method 4022	I_Z = (1) mA	±5.0	%
2	Reverse Current	I_R	Method 4016	V_R = (2)	±100 or (3) 100	% nA

NOTES

1. See Column 6 of Table 1(a).
2. See Column 9 of Table 1(a).
3. Whichever is greater.

TABLE 5 - CONDITIONS FOR BURN-IN

No.	CHARACTERISTIC	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	T_{amb}	+25 (See Note , Table 1(b))	°C
2	Working Current	I_{Zmax}	See Table 1(a), Column 7	mA

FIGURE 5 - ELECTRICAL CIRCUIT FOR BURN-IN

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION NO. 5000)

4.8.1 Electrical Measurements on Completion of Environmental Tests

The parameters to be measured on completion of environmental tests are scheduled in Table 2. The measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.8.2 Electrical Measurements at Intermediate Points and on Completion of Endurance Tests

The parameters to be measured at intermediate points and on completion of endurance testing are scheduled in Table 6.

4.8.3 Conditions for Operating Life Tests (Part of Endurance Testing)

The requirements for operating life testing are specified in Section 9 of ESA/SCC Generic Specification No. 5000. The conditions for operating life testing shall be the same as specified in Table 5 for the burn-in test.

4.8.4 Electrical Circuits for Operating Life Tests

The circuit to be used for performance of the operating life test shall be the same as shown in Figure 5 for burn-in.

4.8.5 Conditions for High Temperature Storage Test (Part of Endurance Testing)

The requirements for the high temperature storage test are specified in ESA/SCC Generic Specification No. 5000. The temperature to be applied shall be the maximum storage temperature specified in Table 1(b) of this specification.

TABLE 6 - ELECTRICAL MEASUREMENTS AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING

No.	CHARACTERISTICS	SYMBOL	SPEC. AND TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
1	Zener Voltage	V_Z	MIL-STD-750 Method 4022	I_Z = (1)	(3)	(2)	V
2	Reverse Current	I_R	MIL-STD-750 Method 4016	V_R = (4)	(5)	-	µA

NOTES

1. See Column 6 of Table 1(a).
2. See Column 4 of Table 1(a).
3. See Column 5 of Table 1(a).
4. See Column 9 of Table 1(a).
5. See Column 10 of Table 1(a).